# PHANTOM
## VEO-SERIES

**ISSOFT**

# PHANTOM
# VEO 640
# VEO 440

## HIGH-SPEED CAMERA

**4 Megapixels, 2560 x 1600**
**Up-to 1,490 fps (640)**
**1,100 fps (440)**
**L and S Body Styles**

# FEATURES & BENEFITS

## PHANTOM VEO PRODUCT FAMILY

The VEO 640 and 440 belong to the core VEO product family, offering four-megapixel high-speed imaging for HD video quality and the resolution required for advanced motion analysis techniques.

## EXTREME CONFIGURABILITY

VEO cameras are available in color or monochrome, up to 72GB RAM, with a variety of lens mounts and two body styles to allow users to **choose the best configuration** in terms of features and budget:

- **L-model** is for basic, software based imaging in a lab or office environment
- **S-model** provides additional signals, on-camera controls for untethered and remote recording, ruggedized connectors and compatibility with removable CFast 2.0 storage media.

**VISION RESEARCH / AMETEK**

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## IMAGE & SENSITIVITY

| | |
|---|---|
| Sensor Type | CMOS, with Global Shutter |
| Maximum Resolution | 2560 x 1600 |
| CAR Increments | 128 x 4 |
| Pixel Size | 10 µm |
| Sensor Size | 25.6 x 16 mm |
| Bit Depth | 12 bit |

| EMVA 1288 Measurements (at 532 nm) | |
|---|---|
| Quantum Efficiency % | 60.2% mono<br>43.6% color |
| Max. SNR (dB) | 41.6 |
| Absolute Sensitivity Threshold (p) | 40.4 mono<br>54.1 color |
| Saturation Capacity (e-) | 14,512 mono<br>14,335 color |
| Temporal Dark Noise (e-) | 23.8 |
| Dynamic Range (dB) | 55.5 |

- Reported measurements were taken at 532 nm with both monochrome and color cameras
- Visit: www.phantomhighspeed.com/emva for more information on EMVA 1288
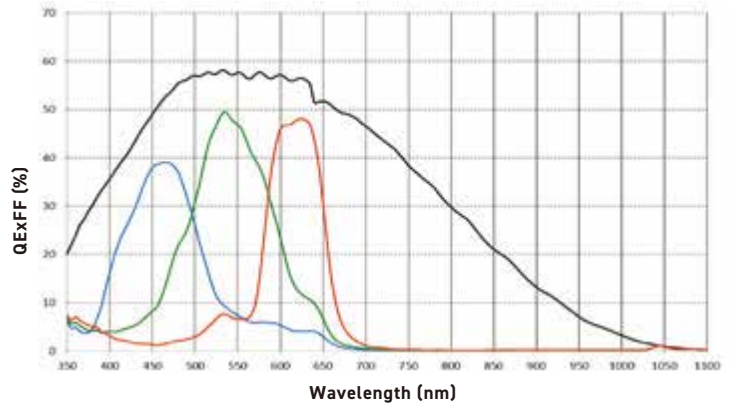
*VEO S-model*

*VEO L-model*

## SPECTRAL RESPONSE

### Quantum Efficiency Monochrome and Color



## CONNECTIVITY & SIGNALS

| Ethernet | Gigabit Standard, 10Gb Optional | | |
|---|---|---|---|
| Timecode | IRIG-B Modulated and Un-modulated | | |
| Port Descriptions | | S-model | L-model |
| | Ethernet | Fischer 8-pin | RJ45 |
| | Power | Fischer 6-pin | Fischer 6-pin |
| | Range Data | Fischer 8-pin | N/A |
| | USB | Yes for WiFi dongle | N/A |
| | Video output | 3G-SDI (2 ports), HDMI | 3G-SDI (1 port), HDMI |
| | Dedicated BNC | Trigger, Time-code-in, 3G-SDI | Trigger, Timecode-in |
| | Programmable I/O BNC | 4 ports | 2 ports |
| I/O Signals | Programmable I/O for Fsync, Strobe, Ready, Timecode-out, Event, Memgate, Pretrigger. Assign and define signals in PCC | | |
| Hardware Trigger | Dedicated BNC | | |
| Software Trigger | Trigger button (S-model); via Ethernet; via Image-based auto trigger (IBAT) | | |
| Synchronization | External Sync via FSync or IRIG Timecode | | |
| Recording Features | Burst mode; Image-based auto trigger, Continuous recording & AutoSave to CFAST (S-model) | | |
| Video Output | 3G-SDI via BNC (rear S-model only); Din and Micro HDMI type D (front). Cameras prior to 2021 had HDMI type A port | | |
| Accessory Power | 4-pin Hirose (front) for 12V monitors up to 1 Amp | | |

## MEMORY & STORAGE

| | |
|---|---|
| RAM Buffer | 18GB, 36GB, 72GB RAM options |
| Multi-Cine | Up-to 64 Partitions |
| Non-Volatile Media | VEO S-model supports CFAST 2.0 (NTFS format) 80 MB/s Cine Raw file transfer rate from RAM |

## FRAME RATES & EXPOSURE

| | |
|---|---|
| Top FPS at Max Resolution | 640: 1,490     440: 1,100 |
| 1 Megapixel FPS | 640: 5,190     440: 3,980 |
| Maximum FPS | 640: 290,000     440: 290,000 |
| Minimum FPS | 24 |
| Minimum Exposure | 1 µs standard |
| PIV Features | Shutter-off mode with a straddle time of 1.7 µs Supports Burst Mode |
| Exposure Features | Extreme Dynamic Range (EDR), Auto-Exposure, Overexposure indication over video and in PCC |

## FRAME RATE CHART

Table provides examples of common resolutions and frame rates. The record times shown are for 72GB RAM at the frame rate shown. Duration will be 1/2 the time for 36GB and 1/4 the time for 18GB RAM.

| Maximum Frame Rate - FPS; (72GB Record time - Sec) | | |
|---|---|---|
| **Resolution (H x V)** | **VEO 640** | **VEO 440** |
| 2560 x 1600 | 1,490 (8.4) | 1,100 (11) |
| 2560 x 1440 | 1,650 (8.4) | 1,230 (11) |
| 1536 x 1536 | 2,350 (9.2) | 1,790 (12) |
| 1920 x 1080 | 2,800 (8.8) | 2,100 (11) |
| 1280 x 1280 | 3,260 (9.6) | 2,500 (12) |
| 1280 x 800 | 5,190 (9.7) | 3,980 (12) |
| 1280 x 720 | 5,760 (9.7) | 4,420 (12) |
| 640 x 480 | 13,500 (12) | 10,900 (15) |
| 512 x 512 | 14,400 (13) | 11,900 (15) |
| 256 x 256 | 36,800 (21) | 32,400 (24) |
| 128 x 128 | 77,900 (40) | 72,600 (43) |
| 128 x 64 | 125,000 (50) | 118,500 (53) |
| 128 x 32 | 180,000 (60) | 173,300 (72) |
| 128 x 4 | 290,000 (340) | 290,000 (340) |

*Certain Phantom cameras are held to export licensing standards. Details available at: www.phantomhighspeed.com/export*

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## CONTROL

| | |
|---|---|
| Software & OS | Phantom PCC (Windows); SDK also available with MatLab and LabView drivers |
| On-Camera Controls | S-models only. Access menu system with encoder, viewed on video monitor. Buttons for trigger, play and save – Color indicates current camera state |
| Primary File Format | Phantom Cine RAW (.cine) |
| Alternative File Formats | Easily convert to formats including .mp4, Apple ProRes .mov, .avi, Tiff, JPG, DNG and many more using PCC. Cine files are directly compatible with many major video editing and motion analysis programs |
| Software Features | Continuous Recording for automated workflows, Integrated Data Acquisition (NI-DAQ), support for DIC Calibration with Sync-Snapshot menu, advanced Image Tools including Crop & Resample, Tone Curves, Filters and more |

## MECHANICAL

| | |
|---|---|
| Housing Variants | L-model and S-model variants |
| Size | L-model: 5 x 5 x 5" (12.7 x 12.7 x 12.7 cm); S-model: 5 x 5.5 x 5" (12.7 x 14 x 12.7 cm) |
| Weight | L-model: 5.0 lbs (2.3 kg); S-model: 5.6 lbs (2.5 kg) |
| Lens Mounts | Choose lens mount at time of purchase: F-mount (with aperture support for Nikon G-style lenses), Canon EF mount (with electronic focus and iris control), PL, C-mount |
| Mounting Points | Standard 1/4 x 20" mounting points on bottom. Top, bottom and side are compatible with Cameo cheese plate for added mounting points, riser, and custom handle |
| Internal Shutter | Standard, for remote black references |
| Cooling | Active cooling. Quiet mode disables fans during capture |

## POWER

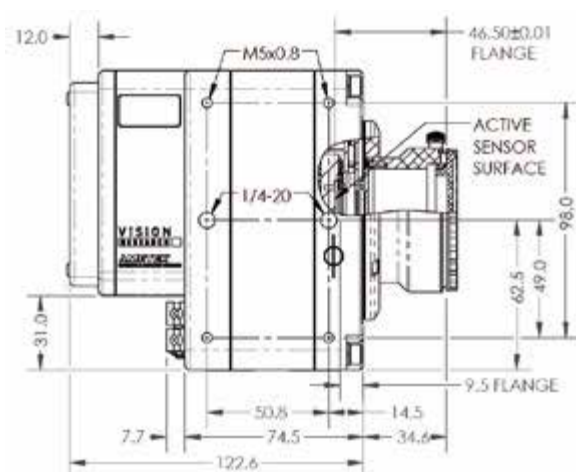| | |
|---|---|
| AC Power | 100-240 VAC, 80W power supply included |
| Voltage Range | 16-32VDC Primary; Secondary Power down to 12VDC via 12-pin capture port (S-models only) |
| Power Consumption | 65W typical |
| Battery Options | S-model includes 12V input for compatibility with common 14.4V batteries. V-Lock and Gold-mount VEO side-mounts are available for VEO-S cameras |

## ENVIRONMENTAL

| | |
|---|---|
| Operating Temperature | -10 to +50°C |
| Storage Temperature | -20 to +70°C |
| Relative Humidity | ≤85% non condensing |
| Operational Shock | MIL-STD-202G Method 213-B. Rated 30G with shutter; 100G without; sawtooth wave, 11ms, +/- 10 pulses all axes |
| Operational Vibration | MIL-STD-202G Method 214-A. Rated 12Grms; Figure 2A-1, Test Condition D, 15 min per axis |
| Regulatory | Made in the USA<br>**Emissions** – CE Compliant EN 61326-1<br>**Immunity** – CE Compliant EN 61326-1<br>**KC Emissions** – KC Compliant KN32<br>**KC Immunity** – KC Compliant KN35<br>**FCC** – CFR 47, Part 15, Subpart B & ICES-0003, Class A<br>**Safety** – IEC 60950-1 |

## GLOBAL SUPPORT NETWORK

The Phantom VEO-Series product line is supported by Vision Research's Global Service and Support network, offering PhantomCare service from multiple sites around the globe. Maximize the value of your Phantom camera with professional support services designed to meet your needs.

Learn more about our service offering at
www.phantomhighspeed.com/Support

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